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The fertility of the soil is scarcely open to description. At the time of our visit, the rice was short, two to three feet high, but wonderfully dense; the buckwheat fields were absolutely white with blossom; the trees of persimmon, chestnut, and russet pears were bending with fruit; the soy beans, pulled up whole and offered that way in the markets, were crowded with pods. And the land must needs be fertile to support the dense population, which appears to be almost one continuous village.

(To be continued)

ROSA NUTKANA

BY J. K. HENRY

This paper aims to present some of the variations of *R. nutkana* as it grows near the coast of southern British Columbia. No account is taken of those forms with simply serrate, mostly eglandular leaflets, which occur at Shawnigan, Vancouver Island, and Spence's Bridge, and which are possibly referable to *R. meleina* Greene, a species reduced to synonymy by Dr A. Nelson. All the forms here examined have doubly serrate leaflets glandular beneath, and more or less glandular calyx and peduncles.

In the neighborhood of Vancouver and Elgin (near Blaine, Wn.) this rose has stout stems 1-3 m. high, at base either naked or densely clothed with rather weak somewhat retrorse prickles. The ordinary prickles vary from narrowly lanceolate to broadly triangular, are usually in pairs or more or less scattered, but often as shown in Figs. 2 and 11 more or less grouped. Such grouping, however, does not appear to be concomitant with other variations, and often occurs in a less marked way. So, too, the broadly triangular prickles may occur with very different fruit-forms,—with subglobose in Fig. 10 and strongly flattened in Fig. 9. Recurved prickles are not at all rare, sometimes occurring with the straight, sometimes (Fig. 8) giving character to a clump.

This species flowers on the flats at Elgin about the end of the first week in June; on dry slopes near Vancouver with a favorable exposure, about fifteen days earlier. The flowers vary in

size from 4.5–8.5 cm. broad (the one in Fig. 14 is 8 cm. broad) and are either solitary or in clusters of two or three. Sometimes there is alternation from year to year in the inflorescence. Fig. 13 shows very marked clustering of fruit, while the following year the flowers were solitary.

The calyx-appendages are either short or long. In the plant of Fig. 13 from Jones Island the appendages are foliaceous, 4–6 mm. wide, and, like the leaflets, serrate and glandular beneath. The shape of the leaflets and their very coarse serration give this specimen a peculiar character. An interesting variation is shown in Fig. 14 where two of the sepals are lobed. Such forms are not rare at Elgin, and occur chiefly in the earliest flowers.

What attracts even the casual observer of the Elgin plants is the variation in the shape of the fruit. Typically, I suppose, the fruit is subglobose or slightly obcompressed. Such is the prevailing form at the coast; but obovoid, ovoid, deltoid, oblong, elongated and strongly flattened forms are very common. Curiously enough at Elgin these various forms often occur pure or almost so; and thus give character to large clumps (Fig. 3). This is in no way due to environment, as several very marked forms alternate in one habitat. Neither is it due, as I at first thought, to the great number of carpels matured in one and the small number matured in another. Whether they represent new forms in process of development or old forms hopelessly confused I cannot say.

On the dike of the Serpentine River near Elgin several of these forms grow together. First were a few low bushes with hispid fruits (var. *hispida* Fernald). Next came a hedge of globose forms; and then, without a gap or change in the character of the clumps, plants practically all the fruits of which were obovoid, longer than wide and with an acute base (Fig. 3). More globose forms were succeeded by strongly flattened forms, the body of which was almost twice as broad as long (Figs. 7, 8, 9); while at the far end of the hedge were some not very healthy-looking plants with elongated necked fruits not reddening well on account of some fungus, though the nutlets were well formed (Fig. 5). Out on the diked flats were globose fruits with or

without a short neck. Fig. 10 shows indistinctly the globose, necked fruits. In the shade of the woods I found a large clump with very large oblong fruits (the body of the largest almost 2 cm. long) which matured very few carpels, probably because of

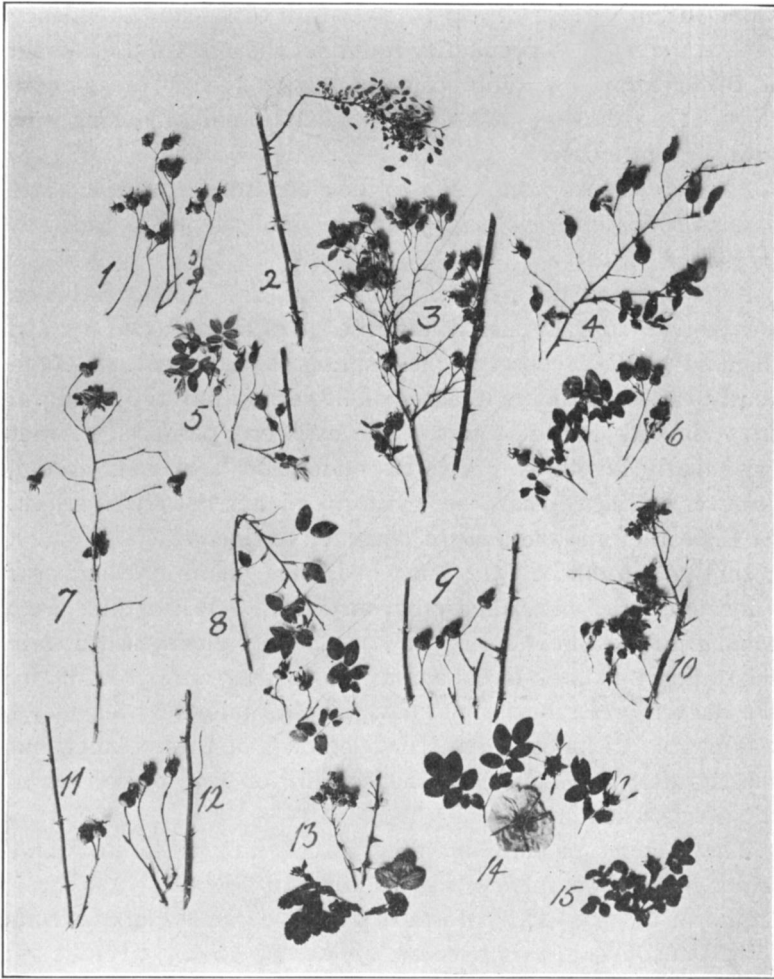


FIG. 1. *Rosa Nulkana*. For explanation of figures see text.

imperfect pollination. The large-fruited form (Fig. 4) growing on an open sunny bank also has few mature carpels (8, 15, 15, 8,

in 4 examined). It should probably be classed as pyriform (mentioned in the next paragraph) though, as is clearly seen in the figure, two of the fruits are subglobose. Lastly, on the flats I found a clump the fruits of which were ovoid-deltoid with a cordate base, and the base of the receptacle correspondingly raised within. (Fig. 6). In 1912 the fruit of this had a tendency to shed the sepals, a peculiarity it did not show in 1913. Deltoid or ovoid forms are quite common mingled with the globose (Figs. 11, 12) but this was the only plant found producing fruit with a cordate base.

For convenience I may refer to the elongated forms with acute base as *pyriform* (Figs. 3, 4, 5) and to the flattened as *napiform* (Figs. 7, 8, 9, 14).

Later I found the pyriform, napiform, and globose forms on low ground along the northwestern edge of a wood, and marked them in order to observe their spring development. I confidently expected different dates of flowering, but the spring of 1913 showed no differences. The exposure, perhaps, was not particularly favorable. A correspondent on Vancouver Island, however, thought that the pyriform plants flowered earliest. At Elgin they showed a slight tendency to ripen early.

In the autumn of 1912 I marked some plants growing near Vancouver with prevailingly pyriform fruit. When these were coming into leaf next spring they were easily distinguished from the ordinary globose forms among which they were growing, by the darker green but somewhat glaucous unfolding leaves. I was unable to follow up the development of these plants, but shortly after at Elgin, no such peculiarities were to be seen in the plants when in full leaf.

The number of fully matured nutlets in well-formed large fruits from Elgin plants was as follows: Globose 53, 39, 48; napiform 67, 70, 61; pyriform 6, 22, 25. (Some globose fruits from Vancouver plants gave 28, 28, 12, 43, 16, 25; average 25; while some rather elongated fruits growing with them but not on the same bushes, gave 15, 12, 6, 15.) Six globose short-necked fruits gave the following: from the top of the branch 44, 35, 27; from the bottom of the same branch 37, 13, 5. This

last suggests failure in pollination, though there was nothing in the outward appearance of the fruits to suggest so few nutlets as 13 and 5. The proportion of undeveloped carpels to developed was greater in the pyriform than in the napiform and globose, but the total original number appeared to be fewer. Of this last point I am not sure, as I neglected to examine flowering specimens. It is worth noting that the same thing happens in the elongated fruits of *R. gymnocarpa*, which commonly mature only 1 or 2 carpels as compared with 4-8 in the globose fruits.

The napiform and globose fruits thus mature the greatest number of carpels. But that this does not determine the final form is clear in the case of napiform fruits at least, from the fact that their peculiar flat shape is quite easily recognized in bud or flower.

There is no concomitant relation between fruit-form and prickle-form. Thus napiform fruits are accompanied by lanceolate (Fig. 7) broadly triangular (Fig. 9) and recurved (Fig. 8) prickles; and pyriform fruits by either lanceolate or triangular prickles. The flowers of napiform plants vary from 4.5-8 cm. in width, and the stipules are either broad (Fig. 14) or medium to narrow (Fig. 8). There is some variation in the glands of sepals and peduncles, but if this has any significance I did not detect it.

Lastly these fruit-forms are not always so pure as in the Elgin plants. Fig. 1 shows a common phenomenon,—the best-developed fruits are mostly pyriform, the others subglobose. (The large fruit at the right in this figure that appears to have a round base, really has an acute base.) Necked and neckless forms may occur on the same plant, as may napiform and globose; while globose forms readily vary into ovoid or deltoid. While, then, my observations result negatively, it is quite possible that a wider survey may show greater significance in these forms than I have been able to detect. The most important and apparently the most widely distributed is the pyriform, which shows a tendency to mature fewer nutlets than the globose or napiform.

VANCOUVER, B. C.